Refine Search

Search Results -

Terms	Documents
L6 and L7	4

Database:
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EPO Abstracts Database
JPO Abstracts Database
Derwent World Patents Index
IBM Technical Disclosure Bulletins

Search: L8

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Recall Text | Clear | Interrupt

Search History

DATE: Wednesday, September 08, 2004 Printable Copy Create Case

Set Name side by side	Query	Hit Count	Set Name result set
DB=PGPB,USPT,USOC,EPAB,JPAB,DWPI,TDBD; PLUR=YES; OP=OR			
L8	l6 and L7	4	L8
L7	service adj brake	4828	L7
L6	l3 and L5	18	L6
L5	traction adj control	6792	L5
L4	l2 and L3	2	L4
L3	park adj brake	3033	L3
L2	interrupt and (automatic adj traction)	8	L2
L1	interrupt near (automatic adj traction)	1	L1

END OF SEARCH HISTORY

L8: Entry 3 of 4 File: USPT Sep 25, 2001

DOCUMENT-IDENTIFIER: US 6293363 B1
TITLE: Integrated electronic shift and parking brake system, including security interlock, for motor vehicles

Abstract Text (1):
An electric park brake control (32) for a parking brake actuator (28, 30) selectively operates a brake mechanism (24, 26) at at least one wheel to selectively perform a parking brake function. Inputs to the electric park brake control include an input from a shifter (18) for distinguishing PARK position from other positions. The electric park brake control causes the brake mechanism to perform the parking brake function when the input from the shifter to the electric park brake control discloses that the shifter is in PARK position. The electric parking brakes are integrated with the shifter, eliminating a parking pawl from a motor (12) that propels the vehicle. Neither is an operating cable from the shifter to the motor for operating the parking pawl required. The shifter is coupled in exclusively electrical relationship to a traction inverter module (16) for causing the motor to operate in correspondence with the particular position selected by the shifter. A security controller (50) causes the electric park brake control to apply the parking brake when a security violation is detected.

Brief Summary Text (6):
As the shifter is moved to different positions, a cable couples the shifter motion to a parking pawl on the motor, turning the pawl in correspondence with the shifter motion. The turning of the parking pawl also turns an attached sensor which is electrically coupled to a traction control module that controls the motor. The sensor sends an electric signal to the module corresponding to the position selected by the shifter. The module contains software which acts upon the sensor signal to operate the motor in accordance with the position selected by the shifter.

Brief Summary Text (11):
Briefly, one general aspect of the invention relates to a motor vehicle comprising: wheels that support the vehicle for rolling motion on an underlying surface; an electric traction motor that drives driven ones of the wheels through a drivetrain and that is operated by a shifter to a selected one of multiple positions including a PARK position; brake mechanisms at the wheels; a parking brake actuator that is associated with at least one of the brake mechanisms and that is effective to operate the at least one brake mechanism to perform a parking brake function; a service brake system that is associated with the brake mechanisms and that is effective to operate the brake mechanisms to perform a service brake function; an electric motor control for controlling operation of the traction motor; inputs to the electric control including an input from the service brake system for distinguishing between performance and non-performance of the service brake function and an input from the shifter for distinguishing positions of the shifter; an electric park brake control for the parking brake actuator for selectively operating the at least one brake mechanism to selectively perform the parking brake function; inputs to the electric park brake control including an input from the shifter for distinguishing PARK position from other positions; and wherein the electric park brake control causes the brake mechanism at the at least one wheel to perform the parking brake function when the input from the shifter to the electric

park brake control discloses that the shifter is in PARK position.

Brief Summary Text (12):
Another general aspect relates to a motor vehicle comprising: wheels that support the vehicle for rolling motion on an underlying surface; a powertrain, including a prime mover, that drives driven ones of the wheels; a shifter that operates place the powertrain in a selected one of multiple positions including a PARK position; brake mechanisms at the wheels; a parking brake actuator that is associated with at least one of the brake mechanisms and that is effective to operate the at least one brake mechanism to perform a parking brake function; a service brake system that is associated with the brake mechanisms and that is effective to operate the brake mechanisms to perform a service brake function; an electric park brake control for the parking brake actuator for selectively operating the at least one brake mechanism to selectively perform the parking brake function; inputs to the electric park brake control including an input from the shifter for distinguishing PARK position from other positions, wherein the electric park brake control causes the brake mechanism at the at least one wheel to perform the parking brake function when the input from the shifter to the electric park brake control discloses that the shifter is in PARK position; and a security controller for disclosing a violation of security of the vehicle to the electric park brake control, wherein the electric park brake control causes the brake mechanism at the at least one wheel to perform the parking brake function when the security controller discloses a security violation.

Detailed Description Text (5):
Brake pedal switch 20 is actuated whenever the driver depresses a foot-pedal to apply the service brakes. Actuation of switch 20 also illuminates the vehicle's brake lights.

Detailed Description Text (6):
The vehicle further includes an electric parking brake system which comprises a parking brake mechanism associated with at least one wheel of the vehicle. The actual brake mechanism that may be employed at a particular wheel of the vehicle to perform the parking brake function may be the service brake mechanism for that wheel. In other words, a single brake mechanism at a wheel may be capable of performing both a service brake function and a parking brake function. Alternatively, the parking brake function may be performed by a parking brake mechanism devoted exclusively to performing the parking brake function, in which case the service brake function is performed by a separate service brake mechanism at the wheel.

Detailed Description Text (7):
FIG. 1 shows an example where each of two rear wheels has a respective drum brake mechanism 24, 26 that performs both service and parking brake functions. The example further comprises an electric park brake motor 28 that is mechanically coupled to brake mechanisms 24, 26, such as through an equalizer 30. Detail of the service brake system for operating brake mechanisms 24, 26 as service brakes is not shown, but is conventional. The service brakes can be applied by the driver depressing the brake foot pedal which acts via hydraulic fluid coupling to operate brake mechanisms 24, 26. The brake force applied at each wheel depends on the force with which the pedal is depressed.

Detailed Description Text (8):
Operation of electric park brake motor 28 is controlled by an electric park brake control unit (ECU) 32 to selectively operate brake mechanisms 24 and 26 in unison so as to cause the parking brake to be either applied or not applied. For back-up purposes in the event that ECU 32 is unable to operate parking brake mechanisms 24 and 26, such as in the event of a dead battery for example, motor 28 may be manually actuated by a tool, such as by a manual actuation lever 34.

Detailed Description Text (9):
There are several inputs to ECU 32, including an input from shifter 18 that distinguishes the shifter being in PARK position. ECU 32 causes park brake mechanisms 24, 26 to be applied when the shifter signals the ECU that the shifter is in PARK position.

Detailed Description Text (13):
ECU 32 is coupled exclusively electrically to shifter 18, being coupled to the sensor that is associated with the shifter to signal the particular position selected by the shifter. When shifter 18 is in PARK position, ECU 32 processes the corresponding signal from the associated sensor to operate electric park brake motor 28 in a manner that causes brake mechanisms 24 and 26 to perform a parking brake function. Once the brake mechanisms have been so operated, motor 28 is shut off to conserve power. Because of the nature of the mechanism that couples motor 28 with brake mechanisms 24 and 26, the brakes remain applied without further consumption of electric power until they are released. During this time, ignition switch 38 may be turned off without causing release of the parking brake.

CLAIMS:

1. A motor vehicle comprising: wheels that support the vehicle for rolling motion on an underlying surface; a powertrain, including a prime mover, that drives driven ones of the wheels; a shifter that operates to place the powertrain in a selected one of multiple positions including a PARK position; brake mechanisms at the wheels; a parking brake actuator that is associated with at least one of the brake mechanisms and that is effective to operate the at least one brake mechanism to perform a parking brake function; a service brake system that is associated with the brake mechanisms and that is effective to operate the brake mechanisms to perform a service brake function; an electric park brake control for the parking brake actuator for selectively operating the at least one brake mechanism to selectively perform the parking brake function; inputs to the electric park brake control including an input from the shifter for distinguishing PARK position from other positions, wherein the electric park brake control causes the brake mechanism at the at least one wheel to perform the parking brake function when the input from the shifter to the electric park brake control discloses that the shifter is in PARK position; and a security controller for disclosing a violation of security of the vehicle to the electric park brake control, wherein the electric park brake control causes the brake mechanism at the at least one wheel to perform the parking brake function in response to the security controller disclosing a security violation.

2. A motor vehicle as set forth in claim 1 in which the prime mover comprises an electric traction motor that drives the driven ones of the wheels through a drivetrain; an electric motor control for controlling operation of the traction motor; and inputs to the electric control including an input from the service brake system for distinguishing between performance and non-performance of the service brake function and an input from the shifter for distinguishing positions of the shifter.

3. A motor vehicle as set forth in claim 2 in which the at least one brake mechanism for performing a parking brake function also performs a service brake function when the service brake system operates to perform the service brake function.

4. A motor vehicle as set forth in claim 3 including a service brake switch that is actuated when the service brake function is performed, and a dynamic stop switch that is independent of the service brake switch for causing the electric park brake control to apply the at least one brake mechanism.

5. A motor vehicle as set forth in claim 4 in which the service brake switch

provides an input to both the electric park brake control and the motor control.

Previous Doc Next Doc Go to Doc#